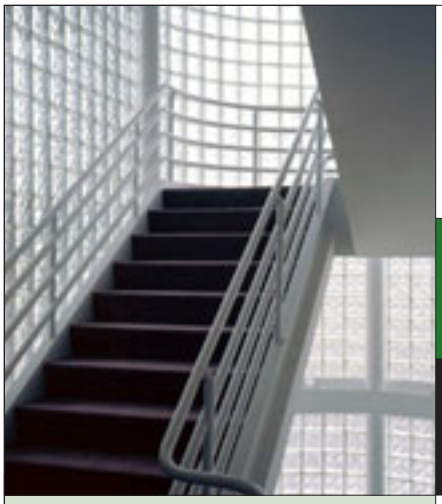


Get to know the *i-codes*

This is the tenth in a series of flyers exploring the differences between the Uniform and International Codes (I-Codes). Topics covered include means of egress, building uses, heights and areas, types of construction, fire-resistance-rated assemblies, accessibility, structural provisions, sprinklers, existing buildings, and the residential and mechanical codes. Additional topics may be added as needed.

Residences & the IRC

About the Codes

The 2003 editions of the International Building, Residential, Mechanical and Fire Codes (I-Codes) replaced the Uniform Codes in Seattle on Aug. 15, 2004*.

Copies can be purchased from the Public Resource Center (PRC), 20th floor, Seattle Municipal Tower, 700 Fifth Ave., (206) 684-8467, or:

- WA Assn. of Building Officials (360) 586-6725, *www.wabo.org*
- International Code Council (ICC) (800) 284-4406, *www.iccsafe.org*

— *I-Codes Training*

I-Code trainings are offered by the following organizations:

- WA Assn. of Building Officials (360) 586-6725, *www.wabo.org*
- International Code Council (800) 284-4406, *www.iccsafe.org*
- American Inst. of Architects-Seattle, (206) 448-4938 *www.aiaseattle.org*
- Structural Engineers Assn. of WA (206) 682-6026, *www.seaw.org*
- Building Industry Assn. of WA (360) 352-7800, *www.biaw.com*
- Master Builders Assn. of King & Snohomish Counties (425) 451-7920, *www.mba-ks.com*

— *Technical Code Support*

- Building Code (206) 684-4630 Hours: M-F, 1 p.m.-4:15 p.m.
- Electrical Code (206) 684-5383 Hours: M/W/F, 7:30 a.m.-5:30 p.m. Tu/Th, 10:30 a.m.-5:30 p.m.
- Energy/Mechanical Code (206) 684-7846 Hours: M-F, 1 p.m.-4:15 p.m.

Designing Wood-Framed Residential Buildings

The new International Residential Code (IRC) governs single-family residences, duplexes and townhouses[1] that are up to three stories high. The IRC is a prescriptive code, providing detailed provisions for constructing foundations, walls, roofs and other building elements.

There are limitations on structural design using the IRC prescriptive provisions:

- Irregular portions of buildings may not be constructed according to the IRC. Section R301.2.2.2.2 describes what is considered irregular.
- Because Seattle is considered to be in Seismic Design Category D_2, buildings more than two stories high may not use the IRC's prescriptive wall bracing provisions. IRC Table R602.10.1, "Wall Bracing," has provisions for Seismic Design Category D_2 for buildings up to two stories.
- The IRC has no provisions for cantilevered walls, so they must be engineered in accordance with the International Building Code (IBC).

As an alternative, detached one- and two-family residences up to three stories may be designed according to the American Forest and Paper Association's *Wood Frame Construction Manual* (WFCM). However, because this manual does not include provisions for townhouses, those with more than two stories must have an engineered design for their lateral-load-resisting systems.

The IBC is an alternative to the IRC and the WFCM. Any residential building may be designed according to the IBC, which contains provisions for both engineered design and a more prescriptive "conventional construction" method. Note that the conventional construction method in the IBC is not exactly the same as prescriptive construction under the IRC. However, the conventional construction sections of the IBC are also limited in application. In Seismic Design Category D_2, they may not be used for one- and two-family residences with more than two stories or for townhouses with more than one story, so an engineered design is required. It should also be noted that cripple walls more than 14 inches high are considered a story for the purposes of compliance with the provisions for conventional construction.

The IRC allows structural systems to be constructed using a "mix and match" approach—the lateral-force-resisting systems may be engineered, while the gravity-load-bearing systems are constructed according to the prescriptive provisions of the IRC. For example, the IRC's prescriptive tables for foundation and basement walls might be used with an engineered design for lateral bracing. However, mixing and matching between IBC conventional construction and the IRC is not allowed; and the WFCM may not be mixed with IRC or IBC provisions.

It's important to remember that, even if a building's structure is not constructed to the IRC, the nonstructural components of the residence can still be designed to the IRC.

[1] *In the IRC, a residence in a group of 3 or more attached units that extends from the foundation to the roof with open space on at least 2 sides. Row houses over a common space, such as a garage, are not considered townhouses.*

** NOTE: The Uniform Plumbing Code, National Electrical Code, and WA State Energy Code with Seattle amendments will continue to be enforced in Seattle and WA.* Updated 12/14/04

Residential Occupancies in the International Residential and Building Codes

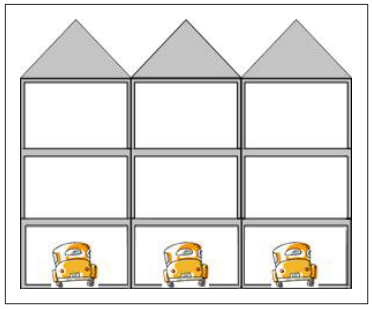
Adoption of the International Residential and Building Codes (IRC and IBC) has brought some subtle changes to the way residential occupancies are treated. Previous editions of the Seattle Building Code defined Group R-3 residential occupancies (one- and two-family dwellings) as "detached dwellings." Since only the IRC distinguishes between detached and attached units, other factors are considered when classifying residences.

The issues surrounding classification of residences are, first, whether the building will be required to comply with the Residential Code or the Building Code. If it is determined that the building must comply with the Building Code, the next question is whether it is classified as an R-2 or R-3 occupancy. The type of separation between units also depends on this classification.

Which Code Applies?

The IRC applies to "detached one- and two-family dwellings and multiple single family dwellings (townhouses) not more than three stories above grade in height with a separate means of egress." All other buildings must comply with the IBC.

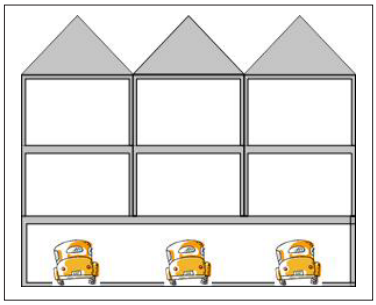
Not everything that is called a "townhouse" is considered a townhouse by the International Codes. According to the IRC, a townhouse is a "single family dwelling unit constructed in a group of three or more attached units in which each unit extends from foundation to roof and with open space on at least two sides." Dwelling units that are located above a common garage, for instance, are not townhouses; they must comply with the IBC if there are three or more units in the building. However, if each residence extends from foundation to roof, has open space on two sides, does not exceed three stories and has a separate means of egress, it is within the scope of the IRC no matter how many units the building contains.



These units are townhouses that can be designed to the IRC.

Residences that don't fall within the scope of the IRC must comply with the IBC. This includes all residences, even single family detached homes, that are four or more stories above grade plane. It also includes side-by-side units that are sited over a common garage.

R-1, R-2 or R-3?



These units are not townhouses and therefore must comply with the IBC. With at least one fire wall between any two of these units, they all could be classified as R-3. Without a fire wall, they are all classified as R-2.

Residences within the scope of the IBC will fall into one of three main categories of residential occupancies: R-1, R-2 and R-3. Group R-1 occupancies have occupants who are transient, such as hotels. Group R-2 includes more permanent residences such as apartments and condominiums. Group R-3 includes single family residences and duplexes.

Townhouse buildings, while not defined in the IBC, can be classified as Group R-3 if fire walls are constructed between every two units. Fire walls are used to create separate buildings, and code provisions generally apply separately to the structure on each side of the wall, so placing a fire wall every two units divides the building into duplexes. Note that townhouses with projected floor area present complications and may not be able to separated into R-3 occupancies.

What Type of Separation is Required?

Residences built according to the IRC are required to be separated from adjacent units. Duplexes must be separated with one-hour assemblies. Townhouses must be separated with either two one-hour walls, or a two-hour wall that contains no plumbing or mechanical equipment, ducts or vents. (Electrical installations are allowed.)

Under the IBC, a fire partition with a rating of one hour or 30 minutes is required between all dwelling units. The rating of the partition depends on the type of sprinkler system installed in the building. If the building is to be classified as a Group R-3 occupancy, a fire wall located between each unit or each two units is required as described above. Fire walls provide a higher degree of fire resistance than fire partitions. IBC Sections 705 and 708 describe the specifics for each type of separation.

Sprinklers

The final impact to be considered is sprinklers. All residences, including R-3 occupancies, that fall within the scope of the IBC must have an automatic sprinkler system. Sprinklers are never required (except for access and water availability for fire-fighting) for residences within the scope of the IRC.

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